July 6, 2015

VIA ELECTRONIC FILING

Tom Wheeler, Chairman
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

GN Docket No. 12-268, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*; WT Docket No. 12-269, *Policies Regarding Mobile Spectrum Holdings*; AU Docket No. 14-252, *Comment Sought on Competitive Bidding Procedures for Broadcast Incentive Auction 1000, Including Auctions 1001 and 1002*

Dear Chairman Wheeler:

The 600 MHz incentive auction will help determine the future of both the mobile Internet and the Internet as a whole because when competitive mobile broadband access becomes a substitute for fixed line service. If the auction is successful, it will advance the critical goal of supporting sustainable and robust structural competition in wireless services. Strong future competition in the mobile broadband market will come from allowing smaller providers to gain access to lower-frequency spectrum that will enable them to compete more effectively with the dominant providers because they will have enhanced indoor and outdoor coverage. Heightened competition, in turn, will force AT&T and Verizon to respond with lower prices or better service offerings across their entire customer base, directly benefitting consumers and encouraging innovation in the marketplace.

This letter builds on the findings of a previous white paper, *Benefits of Competition in Mobile Broadband Services*, in which I explained that the contribution to consumer surplus of sustaining robust facilities-based competition in the U.S. mobile broadband market would add significantly more than $20B in incremental consumer surplus each year, worth over $200B in total.[1] Enlarging the spectrum reserve to at least 40 megahertz will ensure consumers continue to enjoy this surplus, as well as many other substantial benefits arising from robust competition.

The 600 MHz Auction is a Critical Moment for Mobile Broadband Competition

Final rules for the 600 MHz auction are expected from the Federal Communications Commission (FCC) July 16, 2015, in anticipation of the auction occurring in early 2016.[2] The

[1] Lehr, W. (2014) "Benefits of Competition in Mobile Broadband Services," *attached to* Letter from Rebecca Murphy Thompson, General Counsel, Competitive Carriers Association to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket Nos. 13-135, 12-269; GN Docket Nos. 12-268, 13-185 (Mar. 24, 2014).

[2] *See FCC Announces Tentative Agenda for July Open Meeting*, FCC Open Meeting Agenda (June 25, 2015), http://transition.fcc.gov/Daily_Releases/Daily_Business/2015/db0625/DOC-334119A1.pdf.

auction is currently expected to make available 70 megahertz or more of lower-frequency (below 1 GHz) spectrum for mobile network operators (MNOs). This spectrum is uniquely well suited to address MNO coverage and in-building penetration needs, as opposed to capacity demands that are met by higher-frequency spectrum. Recent estimates suggest gross proceeds from this auction may exceed $80B, with net proceeds of $25B.[3] While this amount of gross revenue could represent a one-time boon for broadcast participants, the real benefit comes from the contribution that a robust competitive mobile Internet market could make to the U.S. economy following the auction.

Encouraging a dynamic mobile Internet market with multiple facilities-based MNOs will add to the robustness of our national communications infrastructure and encourage the diversity and competition that sparks innovation. Consumers will benefit from enhanced coverage by all MNOs and also from reduced prices as the dominant providers face increased competition.

Smaller MNO Access to Lower-Frequency Spectrum is Key to Competition

The design of the 600 MHz incentive auction plays an important role in ensuring sustainable competition post-auction. To compete with AT&T and Verizon, smaller carriers need to be able to offer wide area service and strong in-building signals. Access to low-band spectrum is important for small MNOs to provide like-coverage in an economically efficient and competitively meaningful way. As a result, the incentive auction design needs to ensure that competitive providers have a reasonable chance to acquire low-band spectrum without fear of foreclosure.

Spectrum is a scarce resource, but lower-frequency spectrum is especially scarce. The upcoming 600 MHz auction is the only lower-frequency spectrum the government plans to make available at auction in the foreseeable future. Lower-frequency spectrum has unique propagation characteristics that enable signals to have better non-line-of-sight (NLOS) performance than higher-frequency spectrum. Lower-frequency signals are better at penetrating buildings and passing through leaves, raindrops and other barriers that may interfere with higher-frequency transmissions. For rural area coverage and in-building penetration, lower-frequency spectrum is essential.[4]

There are substantial cost savings associated with deploying LTE networks on lower-frequency spectrum. MNOs design their networks as a series of overlapping cells to provide

[3] For an estimate of the gross proceeds, *see* Cramton, P., H. Lopez, D. Malec, and P. Sujarittanonta (2015), "Design of the Reverse Auction in the Broadcast Incentive Auction," *attached to* Letter from Preston Padden, Executive Director, Expanding Opportunities for Broadcasters Coalition to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, AU Docket No. 14-252 (June 15, 2015) ("Design of the Reverse Auction"); and for an estimate of the net proceeds *see* Letter from Keith Hall, Director, Congressional Budget Office to Sen. Dean Heller, United States Senate (Apr. 21, 2015), http://www.cbo.gov/sites/default/files/cbofiles/attachments/HellerLtrProceedsFromAuctions.pdf.

[4] The best frequency to use in any particular situation depends on the context. When the distance from the base station to the mobile user is small, NLOS and longer-range propagation are less important. To balance their requirements, MNOs need both lower- and higher-frequency spectrum.

coverage over their serving area. The larger each cell or area served by each base station, the fewer cell sites are required to serve a given geographic region and the lower the total physical infrastructure costs (for cell sites, antennas, base station radios, and backhaul facilities). Using lower-frequency spectrum makes it feasible for providers to operate with much larger cell sites, and hence realize significant cost savings.[5] For example, Cave & Webb (2013) estimated that the propagation range of a signal goes from 3.1km at 1800 MHz to 6.2km at 800 MHz. An operator using the higher-frequency spectrum would require 4.8 times as many cells as would be needed at the lower frequency.[6] Moral, Vergara *et al*. (2010) estimated that construction of a 3G network using UMTS technology at 900 MHz instead of 2100 MHz would realize capital and operating cost savings of 50% to 70%.[7] If an MNO can cover a given geographic area with fewer cell sites, then the MNO can deploy its network faster and at lower total expense. This substantially reduces the overall costs of constructing a network.[8]

AT&T and Verizon already control 73% of the available lower-frequency spectrum nationwide.[9] With today's imbalance in spectrum resources, AT&T and Verizon are secure in knowing that the competition is unable to match their coverage and indoor signal strength cost-effectively. Verizon's CFO, for example, has openly suggested that Verizon does not find it necessary to compete on price to keep its customers.[10] While all consumers would prefer lower

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[5] *See, e.g.*, Declaration of Mark McDiarmid, Vice President for Radio Network Engineering and Development at T-Mobile USA, Inc. at 3-4, 18, *attached to* Letter from Trey Hanbury, Counsel to T-Mobile USA, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269 (Apr. 1, 2014) ("*McDiarmid Declaration*").

[6] *See* M. Cave & W. Webb, "Spectrum Limits and Auction Revenue: the European Experience," *attached to* Letter from Rafi Martina, Counsel, Sprint Corporation to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269 (July 29, 2013).

[7] *See* Moral, A., A. Vergara, J. Pérez and C. Ovando (2010) "Assessment of the Benefits of Introducing a HSDPA Carrier at 900mhz," *GLOBECOM Workshops (GC Wkshps), 2010 IEEE*. IEEE, 834-38.

[8] An analysis by CostQuest, an economic modeling firm, estimated the costs of constructing a 4G network in 1900 MHz and 700 MHz spectrum and found the costs would be substantially higher at the higher frequency (estimating, for example, that those costs would be as much as 2,108% higher in Kentucky, a rural, mountainous state) using a forward-looking cost model that accounted for differences in geography, population, and network coverage requirements. *See* Letter from Trey Hanbury, Counsel, T-Mobile USA, Inc. to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-269, Docket No. 12-268 (Jan. 29, 2014); *see also Declaration of Mark McDiarmid*.

[9] Policies Regarding Mobile Spectrum Holdings; Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Report and Order*, 29 FCC Rcd. 6133, at 6196 ¶ 153 (2014) ("*Mobile Spectrum Holdings Order*"). Indeed, Verizon executives have been quoted as saying that they do not have an urgent need for additional lower-frequency spectrum. *See* Reardon, M. (2015), "Verizon says it has enough wireless spectrum, but is it just a stalling tactic?" CNET (Feb. 17, 2015), http://www.cnet.com/news/verizon-says-it-has-enough-wireless-spectrum-but-is-it-just-a-stalling-tactic/.

[10] In a recent quarterly earnings call, Francis Shammo, Verizon's Chief Financial Officer, was quoted as saying "If the customer…is just price-sensitive and does not care about the quality of the network—or is sufficient with just paying a lower price—that's probably the customer we're not going to be able to keep." *See* Bode, K., "Verizon Wireless Tells 'Price Sensitive' Customers It Doesn't Want Them, Declares It Doesn't Need To Truly Compete," TechDirt.com (May 11, 2015),

prices, many mobile subscribers are willing to pay a premium for the wider coverage available today from AT&T and Verizon, and the dominant providers account for two out of every three wireless subscribers.[11] More price-sensitive consumers are forced to trade-off coverage for lower prices.

Lower-frequency spectrum holdings directly contribute to the market segmentation that reduces the intensity of price competition. For example, in the first quarter of 2015 T-Mobile, which holds very little lower-frequency spectrum, had an ARPU of $46.43.[12] During the same period, AT&T reported an ARPU of over $66.00.[13] Eliminating today's disparity in access to lower-frequency spectrum will make it feasible for smaller MNOs to match AT&T's and Verizon's coverage, forcing AT&T and Verizon to compete more aggressively on prices and quality, benefiting all consumers. The consumer benefit of promoting sustainable robust competition in mobile broadband services is conservatively estimated to be in excess of $20 billion per year, or more than $200 billion in net present value terms.[14] This is the equivalent of $5 per month for every man, woman and child in the United States.[15]

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https://www.techdirt.com/blog/wireless/articles/20150506/08123630899/verizon-wireless-tells-price-sensitive-customers-it-doesnt-want-them-declares-it-doesnt-need-to-truly-compete.shtml.

[11] *Seventeenth Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, 29 FCC Rcd. 15311, 15321-22 ¶ 22, Table II.B.1 (2014) ("*Seventeenth Mobile Wireless Competition Report*") (indicating that Verizon and AT&T have a combined 246,157,000 wireless subscribers out of 356,170,000 total subscribers nationally, or 69% of all subscribers, and concluding that "[b]ased on the 2014 data, it appears that AT&T and Verizon Wireless together account for roughly two-thirds of the estimated connections, with Sprint and T-Mobile together accounting for slightly less than a third").

[12] *See* T-Mobile, First Quarter 2015 Results, http://newsroom.t-mobile.com/news/2015-q1-earnings.htm.

[13] *See* AT&T, First Quarter 2015 Earnings Slide Presentation at 7, http://phx.corporate-ir.net/phoenix.zhtml?c=113088&p=irol-EventDetails&EventId=5187883. Both the T-Mobile and AT&T ARPUs reported refer to post-paid, which is naturally higher than the overall average which includes pre-paid customers.

[14] *See* Lehr (2014) at 2, 17-18. The estimated savings are based on a commonly used method for estimating the consumer surplus associated with a price reduction that depends on having estimates of only three parameters: an estimate of industry revenues ($184B, slightly less than actual 2012 revenues), an estimate of price-elasticity of demand (-0.5), and the price drop (10%). A discount rate of 10% is used to compute the net present value of the annual savings. These parameter estimates, as explained in the original paper, are almost certainly conservative.

[15] $20B divided by the U.S. population of 321 million (*see* http://www.census.gov/popclock/) is $62/year, or $5.19/month.

A 40 Megahertz Spectrum Reserve Will Enable Post-Auction Competition

To negate the threat to sustainable competition, ***it is important that the FCC increase the spectrum reserve from 30 megahertz to at least 40 megahertz***.[16] This simple and straightforward action will significantly enhance the likelihood that smaller carriers with limited low-band spectrum can provide sustainable competition to the dominant MNOs following the incentive auction. Failing to increase the spectrum reserve risks seriously endangering the economic viability of smaller MNOs and harming consumers without offering a compensating benefit.

The markets for mobile Internet services are highly concentrated and sustaining facilities-based competition is challenging in light of industry economics. AT&T and Verizon account for 70% of all revenue in the wireless sector.[17] For the smaller MNOs to bring meaningful competition to AT&T and Verizon and force them to reduce their prices overall, competitors must be able to offer comparable services in the same geography, which requires additional lower-frequency spectrum resources.

The Department of Justice has warned of the risk of foreclosure in the 600 MHz auction.[18] The dominant MNOs understand that if they can foreclose access to the lower-frequency spectrum needed for small providers to expand their coverage, they can protect their profit margins from competition and potentially fatally weaken the smaller MNOs (or at least make them less effective competitors).[19] The deeper pockets of the dominant providers will make it feasible for them to outbid rivals.[20] The end result of foreclosure would be the dominant MNOs

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[16] *See Mobile Spectrum Holdings Order*, 29 FCC Rcd. at 6135 ¶ 4, 6196 ¶ 153; T-Mobile USA, Inc. Petition for Reconsideration, WT Docket No. 12-269 at 7-12 (Aug. 11, 2014) ("*T-Mobile Petition for Reconsideration*").

[17] *Seventeenth Mobile Wireless Competition Report*, 29 FCC Rcd. at 15326 ¶ 30, Table II.C.2.

[18] Ex Parte submission from William Baer, Assistant Attorney General, U.S. Department of Justice, WT Docket No. 12-269 at 11 (Apr. 11, 2013) ("*DOJ April Ex Parte*"); Letter from William J. Baer, Assistant Attorney General, U.S. Department of Justice to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-269 at 2 (May 14, 2014); Letter from William J. Baer, Assistant Attorney General, U.S. Department of Justice to Marlene H. Dortch, Secretary, FCC, WT Docket No. 12-269 at 2-3 (June 24, 2015) ("*DOJ June Ex Parte*").

[19] *See, e.g.*, *DOJ April Ex Parte* at 8-12; *Mobile Spectrum Holdings Order*, 29 FCC Rcd. at 6156-58 ¶¶ 44-48; *Ex Parte* Letter from the State of Connecticut Public Utilities Regulatory Authority to the Hon. Tom Wheeler, FCC, Docket No. 12-268, WT Docket No. 12-269 at 2 (June 17, 2015); *Ex Parte* Letter from Catherine Bohigian, Executive Vice President, Government Affairs, Charter Communications to Marlene H. Dortch, Secretary, FCC, AU Docket No. 14-252, GN Docket No. 12-268 (May 22, 2015). *See also* UBS, *US Wireless 411: Version 56* Figure 18 (May 14, 2015) (finding that AT&T's and Verizon's EBITA margins were 45.3% and 55.8%, respectively; compared to 25.6% for Sprint and 23.9% for T-Mobile).

[20] A recent study indicates that AT&T and Verizon are expected to be aggressive participants in the broadcast incentive auction, in spite of their significant earlier spectrum outlays in the AWS-3 and earlier auctions. *See* Armbrust, S. (2015), "Can the FCC Attract a Full House for the 2016 Broadcast Incentive Auction?," Kagan Media Appraisals (Feb. 11, 2015), http://www.cramton.umd.edu/papers2015-2019/kagan-fcc-comment-pn.pdf. Bulow, Levin and Milgrom (2009) showed that bidders' budgets rather

further consolidating the market for mobile services, raising prices for consumers and enhancing their own opportunities to earn monopoly profits in the future.[21] Establishing a 40 megahertz reserve enables competitors to gain access to enough lower-frequency bandwidth to challenge the dominant MNOs with competitive broadband offerings while lessening the foreclosure risk.[22] Without any other competitive safeguards available today, the only mechanism to maintain strong structural competition in the future mobile market is the spectrum reserve, and expanding the reserve is the best protection against foreclosure by the dominant providers.[23]

As many MNOs, including AT&T, have stated, a carrier with a 4G LTE network in the U.S. needs at least 20 megahertz of lower-frequency spectrum to provide good service support for mobile broadband services.[24] Increasing the size of the reserve to 40 megahertz will force the dominant providers to bid strongly against each other to win two out of the three blocks of non-reserved spectrum. The desire to win two blocks of unreserved spectrum may induce AT&T and Verizon to compete even more aggressively to avoid losing ground against each other, driving up revenue.[25] As the U.S. Department of Justice has noted, there is a "well-established competition principle that those with market power may be willing to pay the most to reinforce a leading position."[26] By contrast, retaining a 30 megahertz reserve would allow AT&T and Verizon to

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than the license values have the biggest impact on auction pricing. *See* Bulow, J., J. Levin, and P. Milgrom (2009), "Winning Play in Spectrum Auctions," NBER Working Paper No. 14765 (Mar. 2009), http://www.nber.org/papers/w14765.

[21] *See e.g.*, Lehr (2014); Cramton, *Design of the Reverse Auction* at 18.

[22] *Ex Parte* Letter from Neville Ray, Chief Technology Officer, T-Mobile USA, Inc. to Chairman Tom Wheeler, Federal Communications Commission, GN Docket No. 12-268, WT Docket No. 12-269 at 4-5 (June 2, 2015) ("*Neville Ray Ex Parte*").

[23] In 2001 the Commission eliminated the CMRS spectrum cap in favor of case-by-case review by scheduling the cap for elimination as of Jan. 1, 2003. *See 2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services*, Report and Order, 16 FCC Rcd. 22668, 22693 ¶¶ 47, 22710-11 ¶ 47, 93 (2001). The current spectrum screen is limited to the secondary market, and does not apply to the 600 MHz auction. *Mobile Spectrum Holdings Order*, 29 FCC Rcd. at 6135 ¶ 4.

[24] *See, e.g.*, *Mobile Spectrum Holdings Order*, 29 FCC Rcd. at 6210 ¶ 190; *T-Mobile Petition for Reconsideration* at 7-12; Letter from Joan Marsh, Vice President—Federal Regulatory, AT&T Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, Docket No. 12-269 at 2 (Apr. 16, 2014).

[25] Auction theory predicts and experience has shown that auctions with odd blocks and the threat of asymmetric spectrum outcomes intensify competition among dominant rivals. *See* Cramton, P. (2014), "Auction Revenues and Competition Policy in the 600 MHz Auction," (May 2014), on behalf of Competitive Carriers Association, WT Docket No. 12-269, GN Docket No. 12-268 (filed May 8, 2014); Grimm, V., F. Riedel, and E. Wolfstetter (2003), "Low Price Equilibrium in Multi-Unit Auctions: The GSM Spectrum Auction in Germany," International Journal of Industrial Organization 21, 1557–1569; Klemperer, Paul (2002), "How (not) to Run Auctions: The European 3G Telcom Auctions," European Economic Review, 46, 829-845; and Cramton, P. (2014), "Lessons from the Canadian 700 MHz Auction," *attached to* Letter from Trey Hanbury, Counsel, T-Mobile USA, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269 (Apr. 3, 2014).

[26] *DOJ June Ex Parte* at 3.

acquire at least 20 megahertz each—half of the remaining 40 megahertz or more of unreserved spectrum—without having to bid aggressively against each other.

Raising the size of the spectrum reserve does not threaten the ability of the auction to clear spectrum since demand for reserve blocks by eligible bidders must be sufficient to clear the revenue threshold or the spectrum will never become reserved.[27] The auction provides a market-based self-correcting mechanism if the reserve is set too high.[28] By contrast, denying access to adequate lower-frequency spectrum asymmetrically, and potentially irreparably, would harm both smaller and emerging MNOs and consumers.[29]

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The spectrum reserve is the sole mechanism in the current auction design that is intended to address the challenge of ensuring that the allocation of spectrum is compatible with sustaining the economic viability of structural competition, a key goal of the Recovery Act that enabled the 600 MHz auction.[30] Because the reserve is the last, and only, line of defense against anti-competitive foreclosure, expanding the reserve to 40 megahertz is a simple and easily accomplished way of ensuring the success of the 600 MHz Auction and avoiding the unnecessary risk of threatening the viability of continued facilities-based MNO competition.

Pursuant to the Commission's *ex parte* rules, please associate this letter with the above-referenced dockets.[31]

Sincerely,

/s/ William Lehr

William Lehr
Consultant to T-Mobile USA, Inc.

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[27] *Mobile Spectrum Holdings Order*, 29 FCC Rcd. at 6209 ¶ 186-87.

[28] The actual amount of reserve spectrum available will be determined at a spectrum reserve trigger and be based on the amount of reserve spectrum demanded by reserve-eligible bidders in each market at the time the trigger is satisfied. *Id.*

[29] *See, e.g.*, *id.* at 6160 ¶ 54; *Seventeenth Mobile Wireless Competition Report*, 29 FCC Rcd. at 15355-56 ¶¶ 90-92; *Neville Ray Ex Parte* at 4-5; *Declaration of Mark McDiarmid*; Letter from Trey Hanbury, Counsel to T-Mobile USA, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268, WT Docket No. 12-269 (May 13, 2014).

[30] Although commenters proposed alternative protections such as the Dynamic Market Rule, they were ultimately rejected. *See* Gregory Rosston & Andrzej Skrzypacz, "A Dynamic Market Rule for the Broadcast Incentive Auction: Ensuring Spectrum Limits Do Not Reduce Spectrum Clearance," *attached to* Letter from Trey Hanbury, Counsel, T-Mobile USA, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 & WT Docket No. 12-269 (filed July 26, 2013); *Mobile Spectrum Holdings Order*, 29 FCC Rcd at 6202-03 ¶ 169.

[31] 47 C.F.R. § 1.1206(b)(2).